FISHERY RESEARCH

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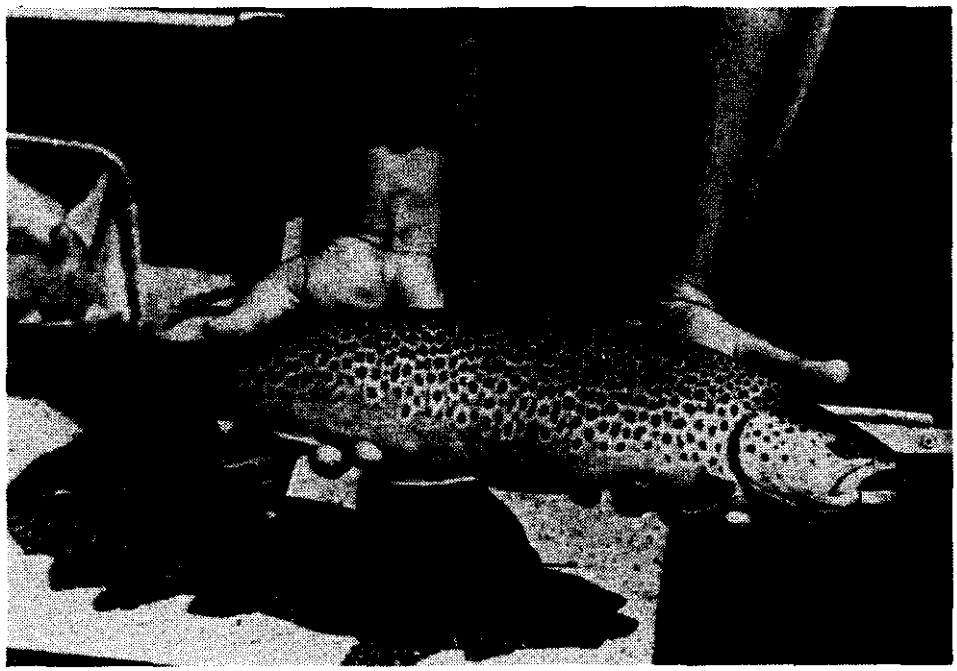
Job Performance Report, Project F-73-R-9
Subproject IV: RIVER AND STREAM INVESTIGATIONS
Study VI, Job No. 1: Snake River Game Fish Populations,
Fishing Pressure and Harvest,
American Falls Reservoir to South Fork



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January 1988

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JOB PERFORMANCE REPORT

State of: Idaho

Name: RIVER AND STREAM INVESTIGATIONS

Project No.: F-73-R-9

Title: Snake River Game Fish Populations, Fishing Pressure and Harvest, American Falls Reservoir to South Fork

Study No.: VI

Job No.: 1

Period Covered: March 1, 1986 to February 28, 1987

ABSTRACT

From April 21 to November 2, 1986, 651 anglers were interviewed who fished 796 hours in the Snake River between the Henrys Fork confluence and American Falls Reservoir to catch 113 trout. The catch was comprised of hatchery rainbow (37%), brown (34%), cutthroat (16%) and wild rainbow trout (13%). Between July 21 and October 7, 1986, 2,736 game fish were sampled by electrofishing. Whitefish comprised 86% of the sample, followed by brown (8%), cutthroat (2%), hatchery rainbow (2%) and wild rainbow trout (1%). Brown trout averaged 337 mm long, wild rainbow 206 mm, cutthroat trout 326 mm and hatchery rainbow trout 260 mm.

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INTRODUCTION

The upper Snake River survey was reactivated in 1986 as a continuation of the original Snake River inventory project which was initiated in the early 1970s and continued through the early 1980s. This project evaluated the fish populations and fisheries of the Snake River between Hells Canyon and American Falls Dam (Welsh and Reid 1970; Goodnight 1972; Reid 1972; Reid et al. 1973; Gibson 1974, 1975; Gibson and Mate 1976; Cochnauer 1980, 1981; Lukens 1982) . The fish population and fishery of American Falls Reservoir were evaluated in 1981 and 1982 (Heimer 1984). The upper Snake River project extends the inventory to the portion of the Snake River between American Falls Reservoir and the Henrys Fork confluence.

This portion of the Snake River is located in southeastern Idaho and includes 156 km of river that was divided into six sections (Table 1, Figure 1). This part of the Snake River is characterized by a low-gradient, meandering and braided channel bordered by vast areas of dense riparian vegetation, particularly in sections 1, 4, 5 and 6. Vehicular access is limited in sections 1, 2, 4 and 5 due to private ownership of adjacent lands. Section 3, which flows through Idaho Falls, is readily accessible by vehicle. Access in Section 6 is limited not only by private ownership along the northwestern shore but also by the Shoshone-Bannock Reservation, which includes the entire southeastern shore of this section. Section 6, most of Section 5, half of Section 2 and all of Section 1 are boat navigable. Boat navigation in the remaining areas is interrupted by a number of irrigation and hydro diversions (Table 1).

Mean monthly discharge at Shelley was 49% greater in 1986 than the last 10-year average (Figure 2). Discharge ranged from 4,625 cfs in August to 23,060 in May and averaged 10,457. Due to numerous irrigation withdrawals, discharge was lower at Blackfoot than Shelley, 61 km downstream.

Average monthly temperature measured near Shelley ranged from 1.0 °C in January to 17.5 °C in July and averaged 9.8 °C during 1986 to 1987 (Figure 3). Temperature in Section 6 (below the Blackfoot River) was slightly cooler during the summer months (and presumably warmer during winter) due to the influence of numerous springs in this area.

OBJECTIVES

To determine the status of game fish populations in the Snake River between American Falls Reservoir and the confluence of the South Fork and Henrys Fork.

To estimate fishing pressure and harvest in the same section of the Snake River.

Table 1. Location, length, gradient and number of diversion structures (I = irrigation, H = hydro) for each of the six sections within the Snake River study area.

Section	Location (Rkm)	Length (km)	Gradient (m/km)	Diversion structures
1	Henrys Fork - Highway 48 Bridge (1,311.8 - 1,339.3)	27.5	0.6	1I
2	Highway 48 Bridge - Upper Power Plant (1,288.0 - 1,311.8)	23.8	0.6	3I
3	Upper Power Plant - Lower Power Plant (1,277.5 - 1,288.0)	10.5	1.3	3H, 1I
4	Lower Power Plant - I-15 Bridge (1,230.2 - 1,277.5)	47.3	1.1	2H*, 9I
5	I-15 Bridge - Blackfoot River (1,182.3 - 1,207.7)	22.5	1.0	1I
6	Blackfoot River - American Falls Reservoir (1,207.7 - 1,182.9)	24.8	0.8	0

*Gem State project under construction and Shelley site proposed.

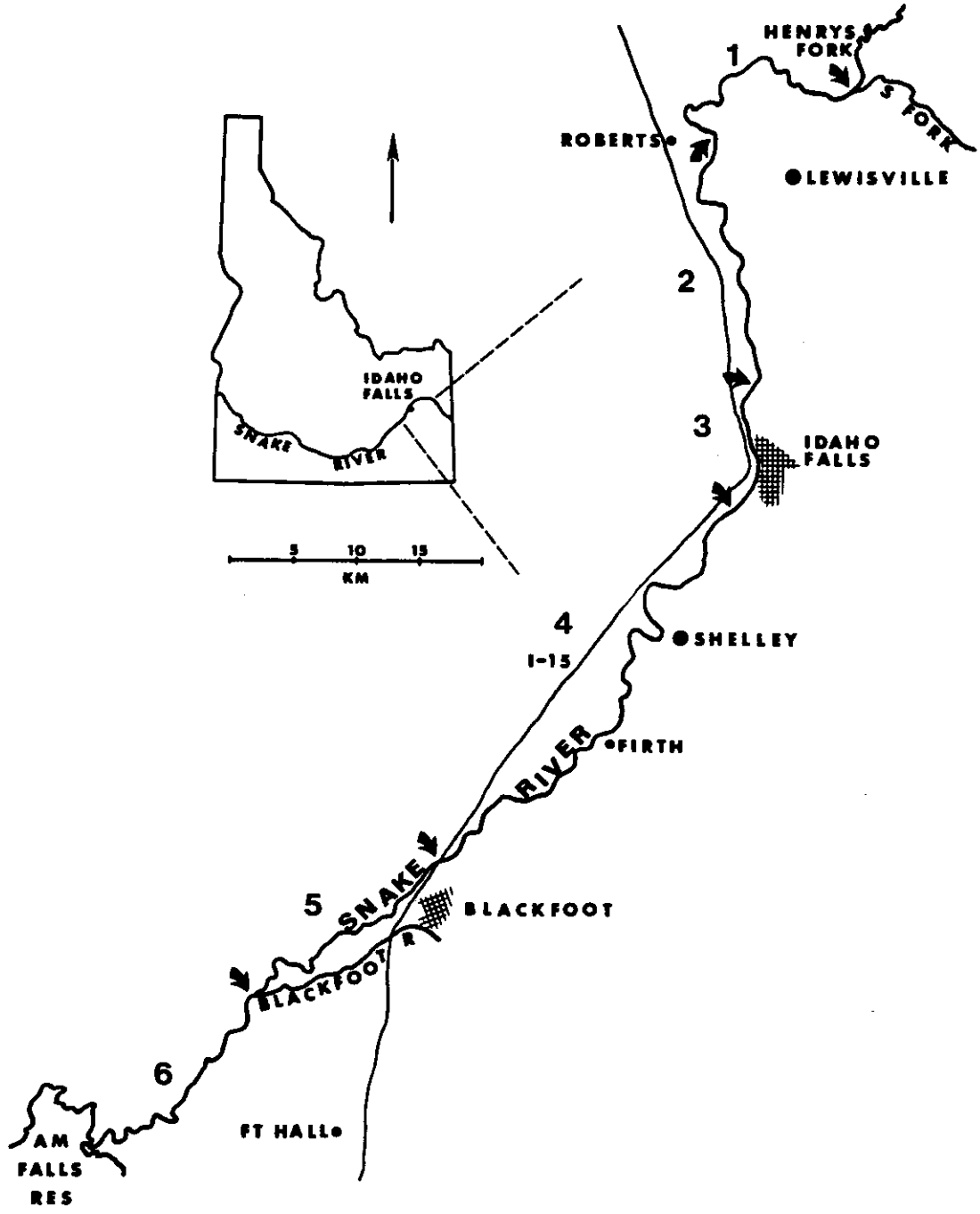

Figure 1. Map of the Snake River study area. Arrows indicate boundaries of the six sections.

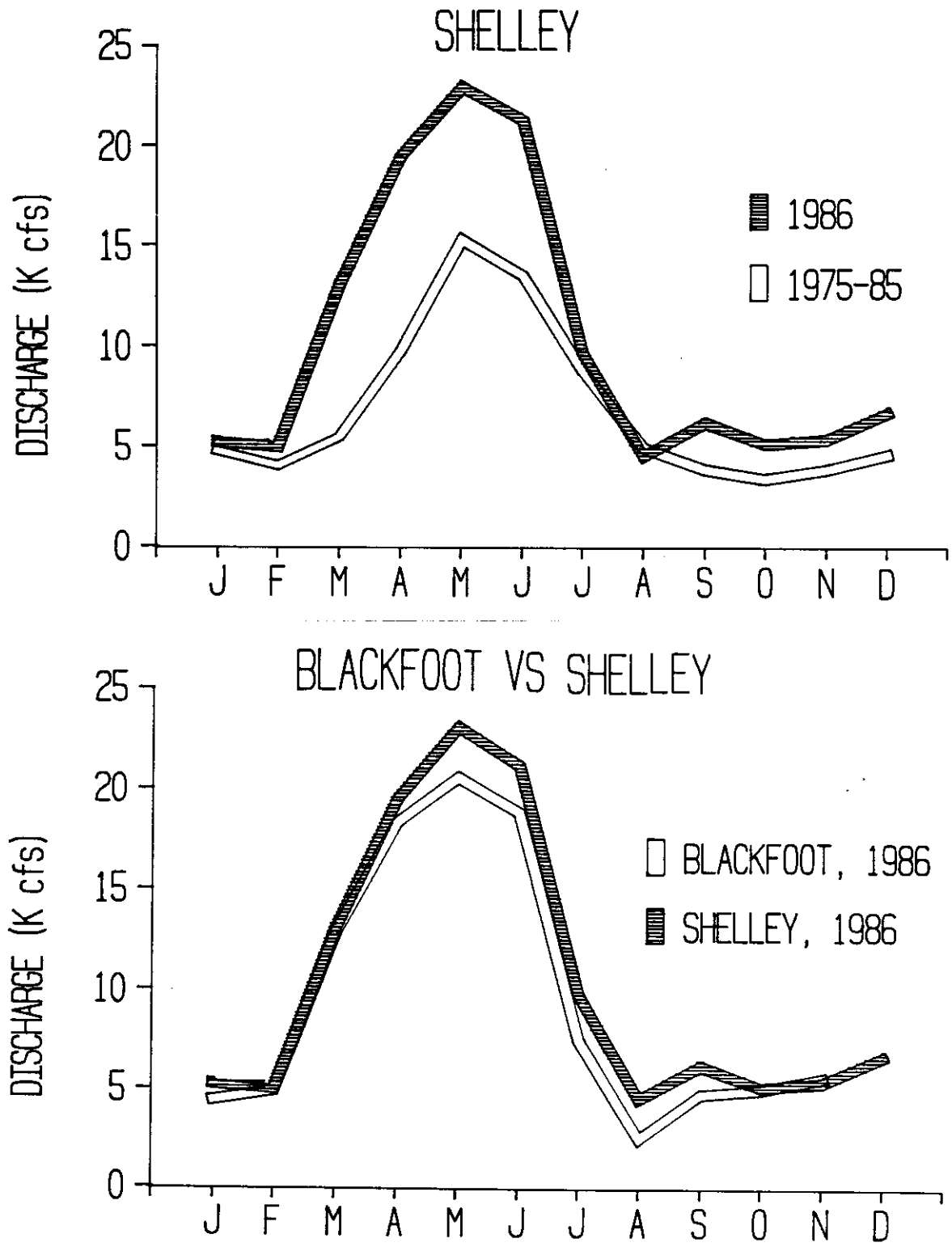

Figure 2. Discharge of the Snake River measured at the gage near Shelley (#13060000), 1979-85 and 1986, and discharge at the Blackfoot gage (#13069500) compared to Shelley, 1986.

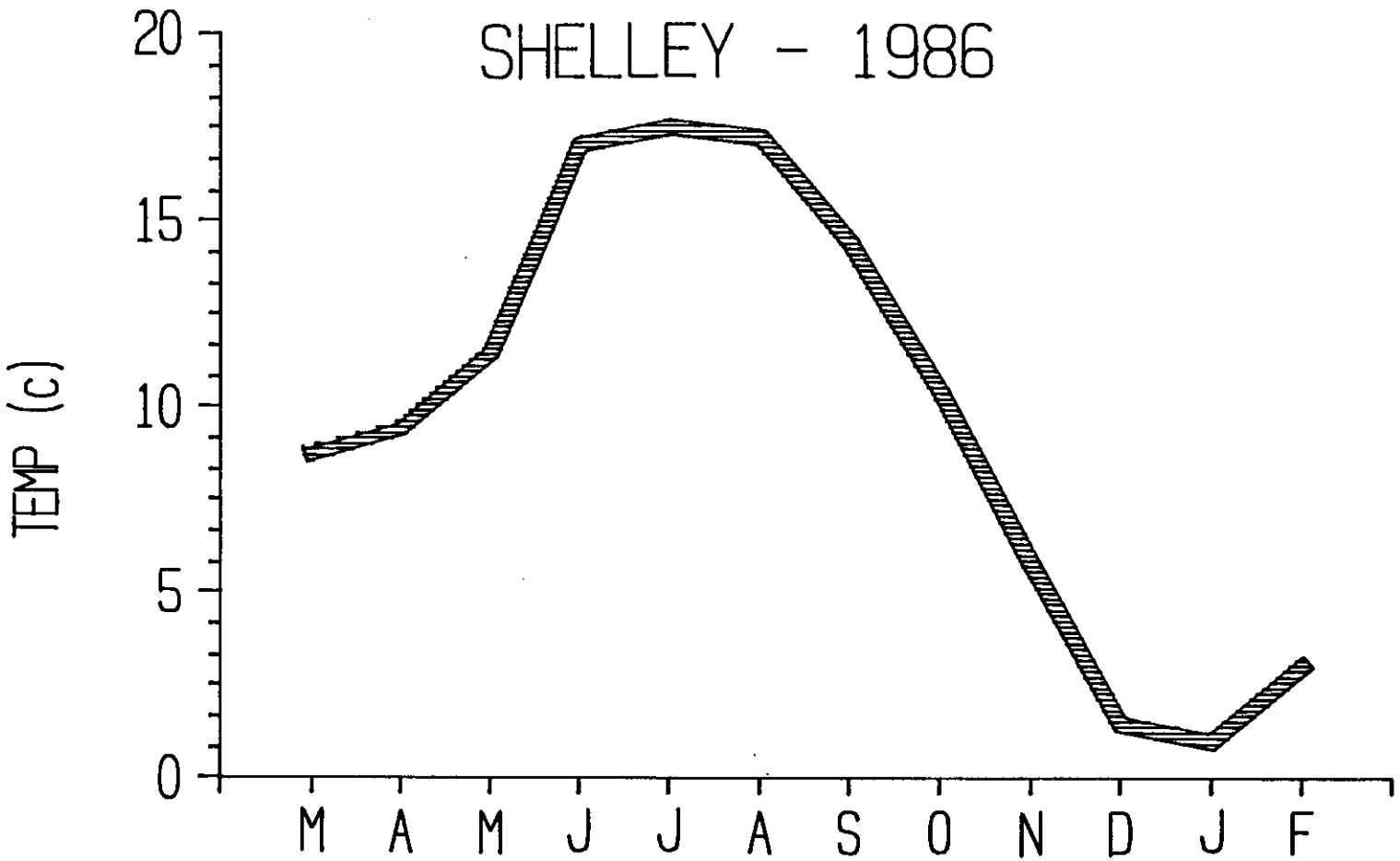

Figure 3. Mean monthly temperature of the Snake River measured at various locations within the proposed Shelley hydro site (CH_2M Hill 1984).

RECOMMENDATIONS

Develop additional access to the river between Henrys Fork and Highway 48 Bridge. Market Lake Wildlife Management Area would provide a good access site.

Increase releases of hatchery-reared, catchable rainbow trout into the Snake River adjacent to Idaho Falls.

Release hatchery-reared brown trout fingerlings throughout the river between the Lower City Power Plant and Blackfoot in the spring.

Consider experimental releases of smallmouth bass fingerlings into the river between Tilden Bridge and American Falls Reservoir. Scatter releases throughout the entire area during mid-June for prespawning adults and July to August for juveniles to coincide with optimum temperatures.

METHODS

Creel Census

Anglers were interviewed while fishing in each section of the Snake River from April 21 to November 2, 1986. Anglers were censused for residency, hours fished, fishing method (boat or bank), gear type (bait, lure, fly) and number and length of fish caught. .No attempts were made to estimate total effort and harvest or to determine distribution of effort. The census period was divided into 14 two-week intervals.

Fish Population Sampling

Fish were sampled from each river section, primarily during daylight hours, with a Smith-Root electrofishing boat, Model SR18E. Sampling was conducted from July 21 to October 7. Each game fish was measured to the nearest millimeter total length and all trout were weighed to the nearest 2 g, 10 g or 25 g, depending on fish size. Each trout (except hatchery rainbow) was sampled for scales from the area between the dorsal fin and the lateral line. All catchable-sized trout were also jaw tagged. No attempt was made to enumerate nongame fish.

RESULTS

Creel Census

From April 21 to November 2, 1986, we interviewed 651 anglers who fished 796 hours in the Snake River between the Henrys Fork confluence and American Falls Reservoir to catch 113 trout (Table 2). Catch rates varied little between sections and ranged from 0.10 trout/hour to 0.18 trout/hour. Creel census data, by two-week intervals, is listed for each of the six sections in Appendices A to F.

Table 2. Angler interview data collected within **six** sections of the Snake River between Henrys Fork and American Falls Reservoir from April 21 to November 2, 1986.

Section	Number of anglers	Hours fished	Number of trout	Catch rate (trout/hr)
1	33	52	8	0.15
2	46	56	10	0.18
3	315	379	55	0.15
4	190	210	29	0.14
5	22	11	2	0.18
6	45	88	9	0.10
Total	651	796	113	0.14

Hatchery rainbow trout and brown trout comprised almost equal portions and the majority of the catch (37% and 34%, respectively) followed by cutthroat trout (16%) and wild rainbow trout (13%) (Figure 4). Virtually no effort was expended within the study area for whitefish.

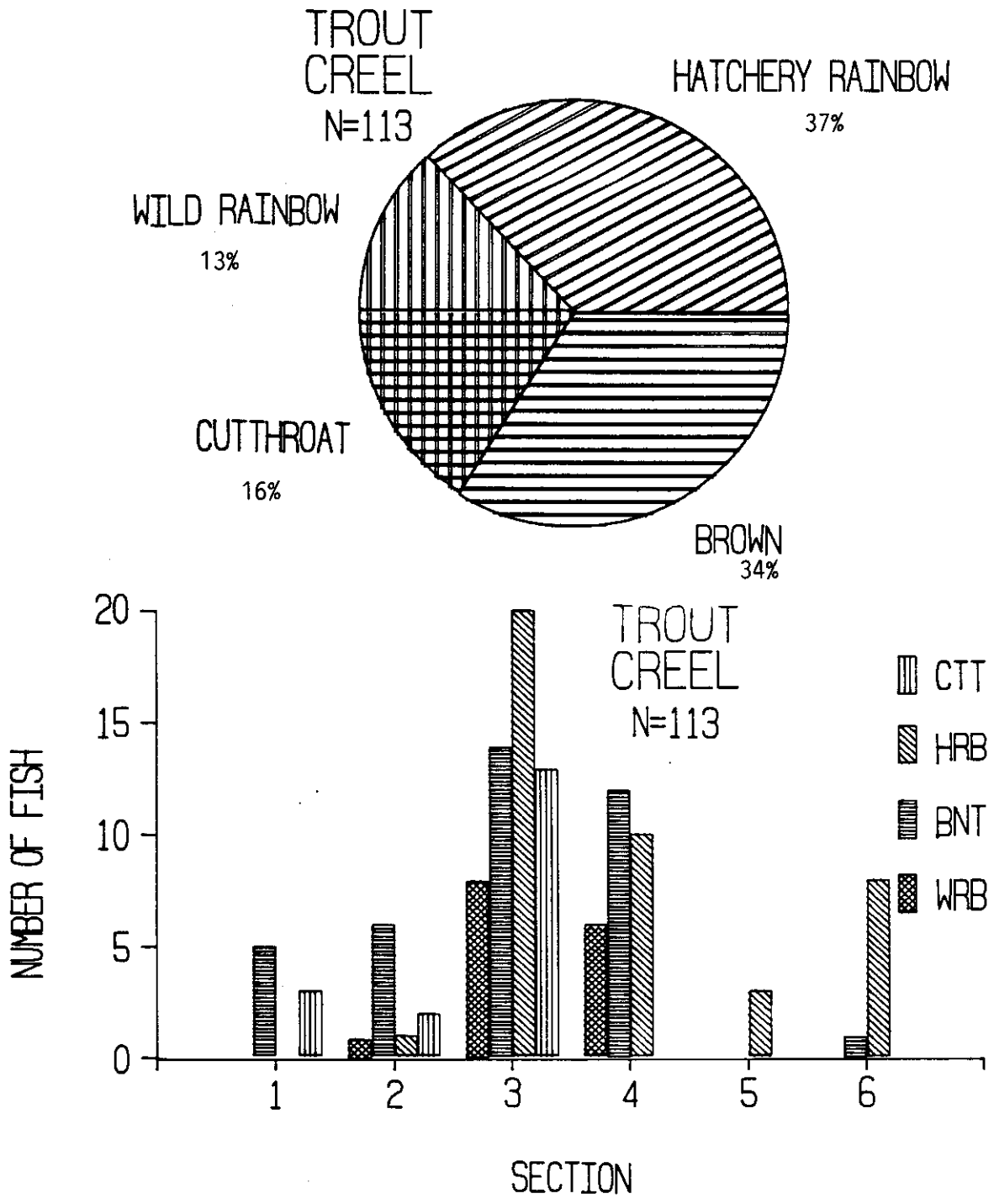

Figure 4. Species composition for trout creeled from the Snake River for the entire study area and by section, Henrys Fork to American Falls Reservoir, 1986.

Brown trout were creeled by anglers fishing in every section but 5 (Figure 4). Hatchery rainbow trout were caught throughout the study area except Section 1. Cutthroat trout were caught in sections 1, 2 and 3 only (the three upper sections). Wild rainbow trout were checked in sections 2, 3 and 4.

Most of the anglers interviewed were residents and fished from the bank with bait (Table 3). The largest proportion of boat angling occurred in sections 1 and 6, which were entirely boat navigable. Most anglers were residents of adjacent counties, primarily Bonneville, Bingham and Jefferson (Appendix G).

Table 3. Residency, fishing method and gear type for anglers fishing six sections of the Snake River between Henrys Fork and American Falls Reservoir, April 21 to November 2, 1986.

			Fishing method		Gear type		
Section	Resident	Nonresident	Boat	Bank	Bait	Lure	Fly
1	33	0	13	20	23	10	0
2	45	1	6	40	41	5	0
3	298	17	5	310	278	36	1
4	185	5	7	183	170	18	2
5	20	2	0	22	20	2	0
6	45	0	9	36	43	2	0
Total	626	25	40	611	575	73	3

Fish Population Sampling

Between July 21 and October 7, 2,736 game fish were sampled with electrofishing gear from each of the six sections. Whitefish comprised 862 of the total sample (Figure 5). Brown trout comprised the majority of trout sampled (56Z) followed by cutthroat (18%), hatchery rainbow (16%) and wild rainbow (10%). Miscellaneous species included yellow perch, which originiated from Market Lake, lake trout emigrants from Palisades Reservoir and rainbow-cutthroat hybrids.

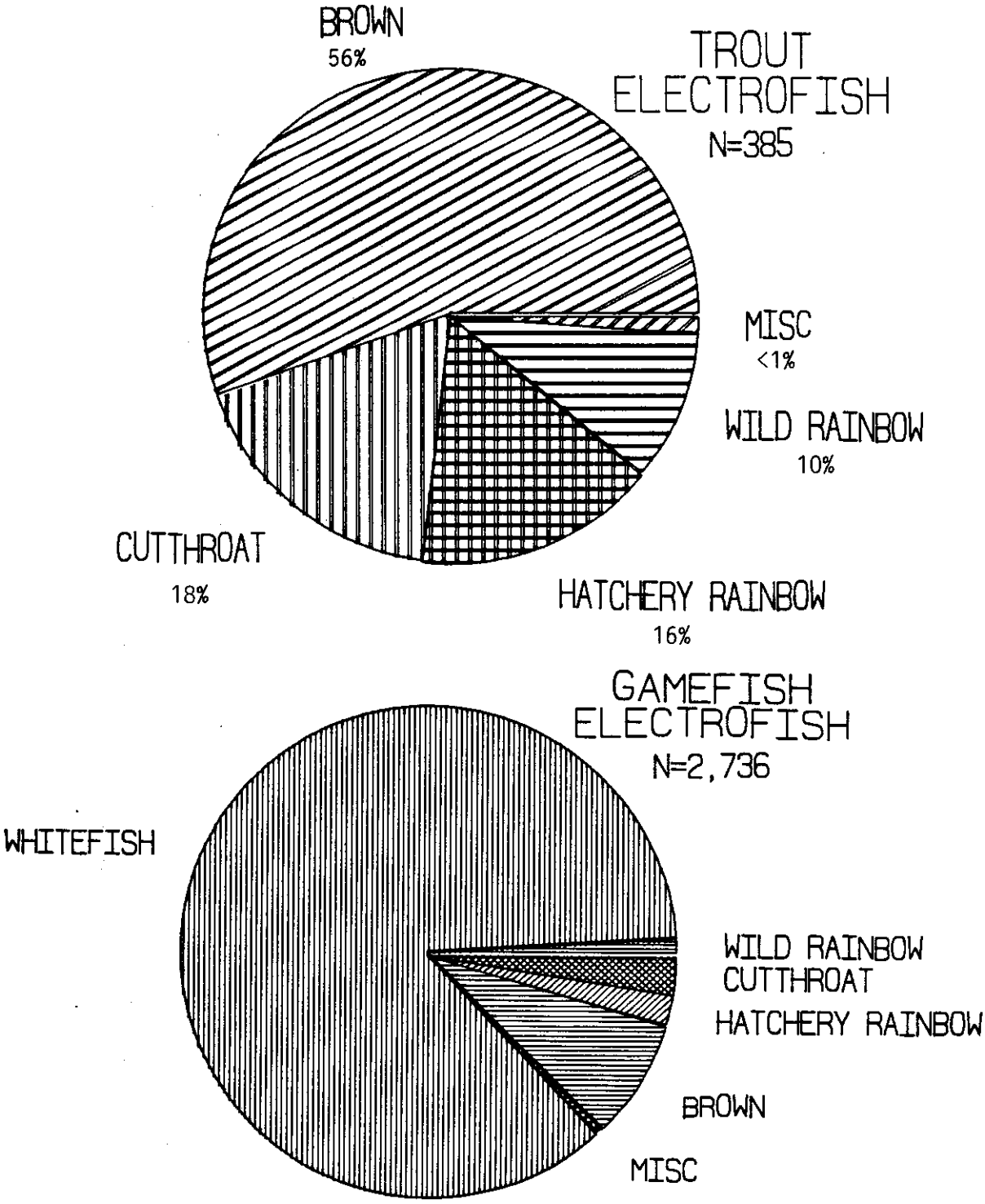

Figure 5. Proportion of trout and game fish in the electrofishing sample collected from the Snake River, Henrys Fork to American Falls Reservoir, 1986.

There was little difference in species composition between sections except that Section 1 had more than twice the proportion of trout (47%) compared to the other sections (Figure 6, Appendix H). Whitefish comprised 52% to 93% of the game fish sampled in the six sections.

Brown trout ranged from 110 mm to 700 mm and averaged 337 mm (Figure 7). The length-weight relationship was defined by the equation: W-8.41 x 10^{-6} x $L^{3.03}$ (Figure 8).

Wild rainbow trout ranged from 130 mm to 530 mm and averaged 206 mm. The length-weight relationship was described by the equation: W-3.29 x 10^{-6} x $L^{3.21}$.

The 67 cutthroat trout ranged from 140 mm to 540 mm long, and the average length was 326 mm. The equation: W-3.44 x 10^{-6} x $L^{3.19}$ described the relationship of length to weight. Cutthroat trout appeared to be a mixture of the Snake River fine-spotted variety and the Yellowstone subspecies but no effort was made to separate races due to hybridization.

Hatchery rainbow trout are a fall spawning Mt. Lassen strain that originated from American Falls Hatchery. Throughout Section 3 (Upper City Power Plant to Lower City Power Plant), 7,585 fish were released at an average size of 2.9/lb during July, August and September, 1986. During July, 4,026 fish were also released into Section 4 near Rose at an average size of 3.3/lb, and 5, 600 fish (3.5/lb) were released into Section 6 at Tilden Bridge. The larger size of some individuals in the electrofishing sample indicated that a few survive the winter and grow.

Whitefish ranged in length from 70 mm to 560 mm and averaged 244 mm (Figure 9).

DISCUSSION

Section 1 (Henrys Fork to the Roberts Bridge) probably represents the best trout habitat within the study area. The habitat is unaltered by irrigation withdrawals or hydro development. This area had the largest proportion of trout in the electrofishing sample and all fish were of wild or natural origin. Many of these fish were probably recruits from Henrys Fork and the South Fork. This area is boat navigable but access is limited to launch sites at the Highway 48 Bridge near Roberts and at the Menan Bridge. Additional access is needed but sites are limited due to private landownership. One possible site would be the Market Lake Wildlife Management Area.

Limited angler interviews in 1986 revealed catch rates of 0.15 fish/hour for brown and cutthroat trout. This catch rate is half of the goal specified in the Idaho Fisheries Management Plan. More specific data will be collected regarding the fishery but until additional access is developed and/or effort increases, hatchery supplementation to improve catch rates may not be necessary. The current fishery is entirely supported by local or upstream natural and wild production.

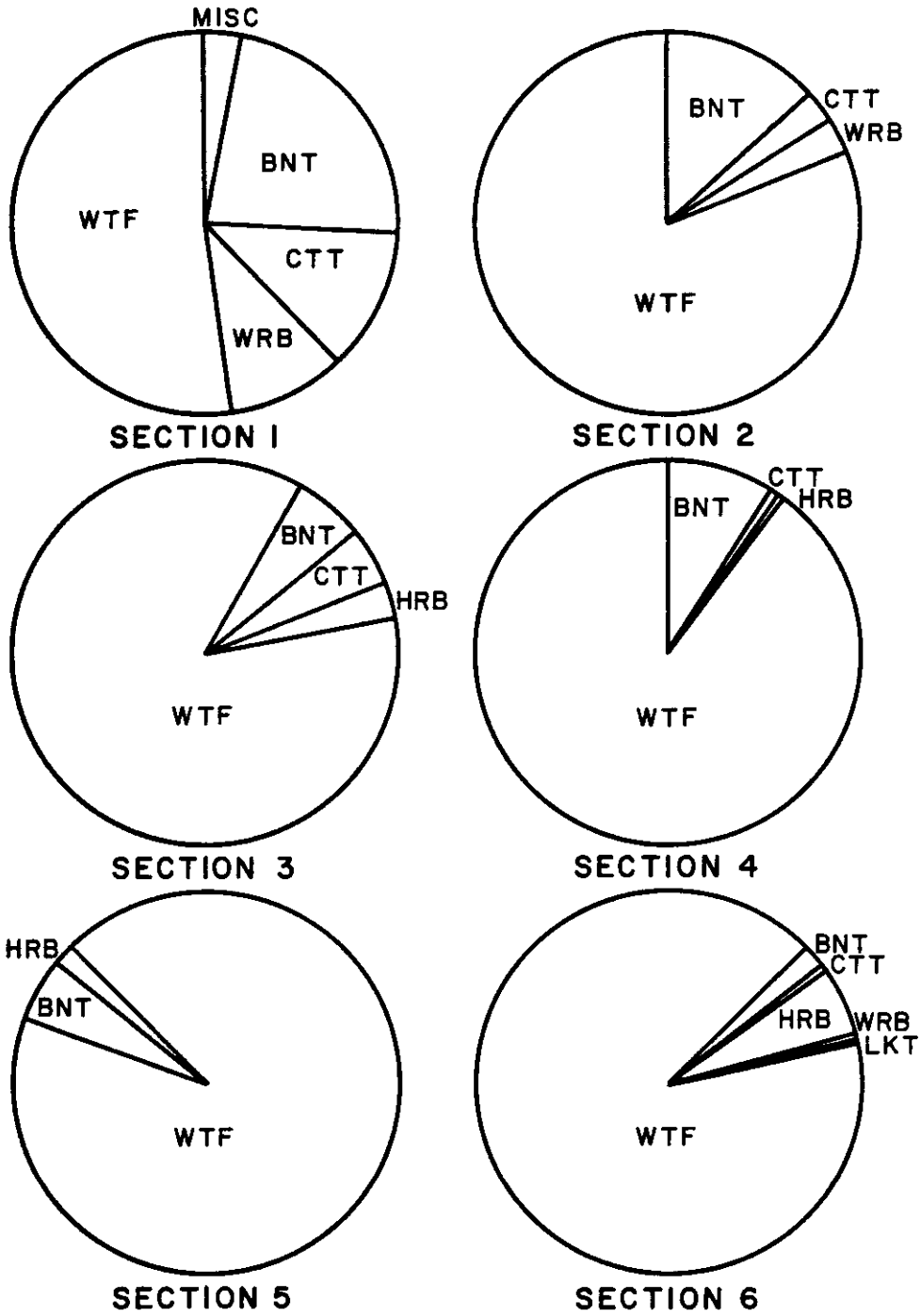

Figure 6. Species composition, by section, for all game fish sampled with electrofishing gear from the Snake River, Henrys Fork to American Falls Reservoir, 1986.

Legend: WTF = whitefish
BNT = brown trout
CTT = cutthroat trout
WRB = wild rainbow trout
LKT = lake trout
HRB = hatchery rainbow trout

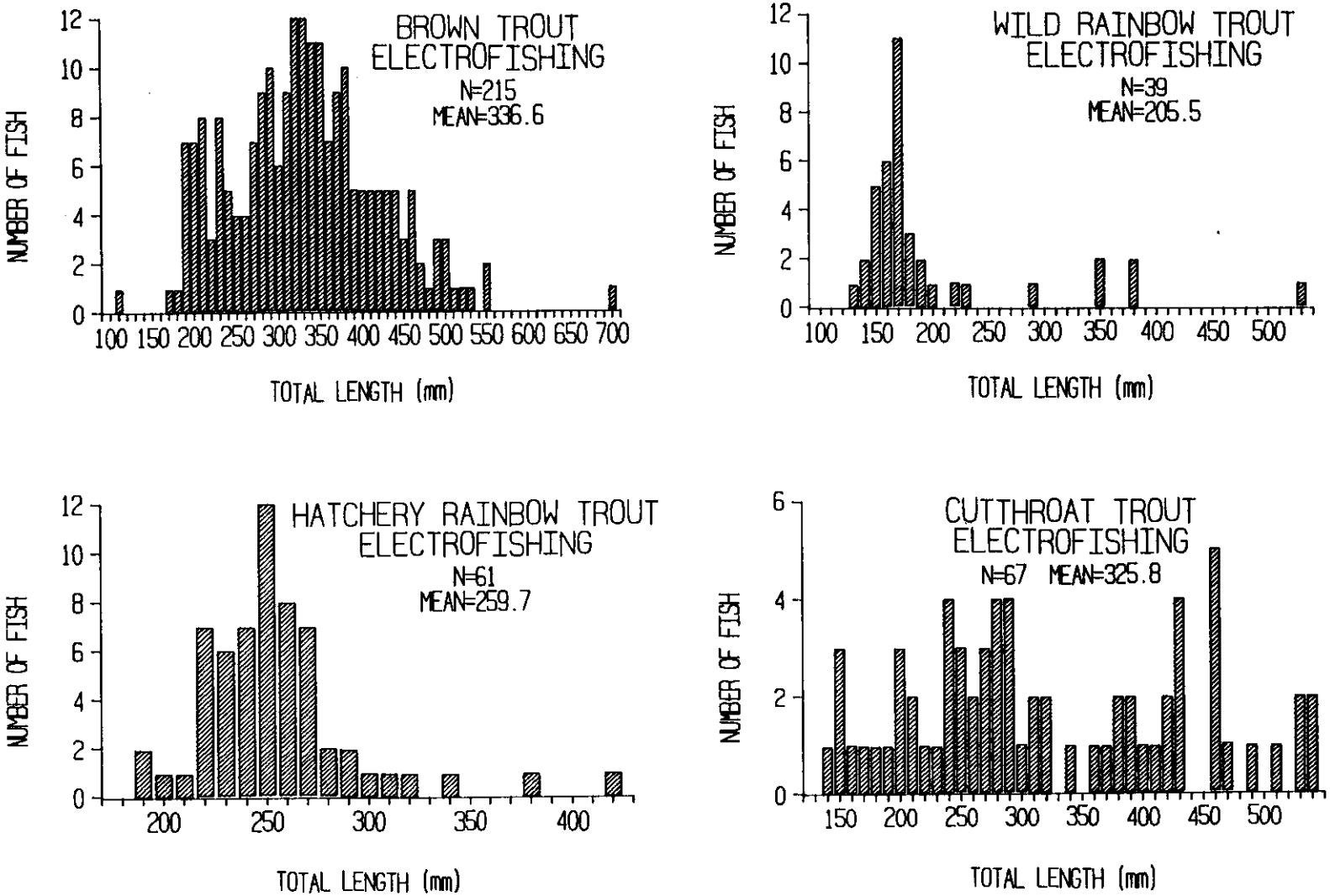

Figure 7. Length frequencies for brown, wild and hatchery rainbow and cutthroat trout sampled by electrofishing the Snake River, Henrys Fork to American Falls Reservoir, 1986.

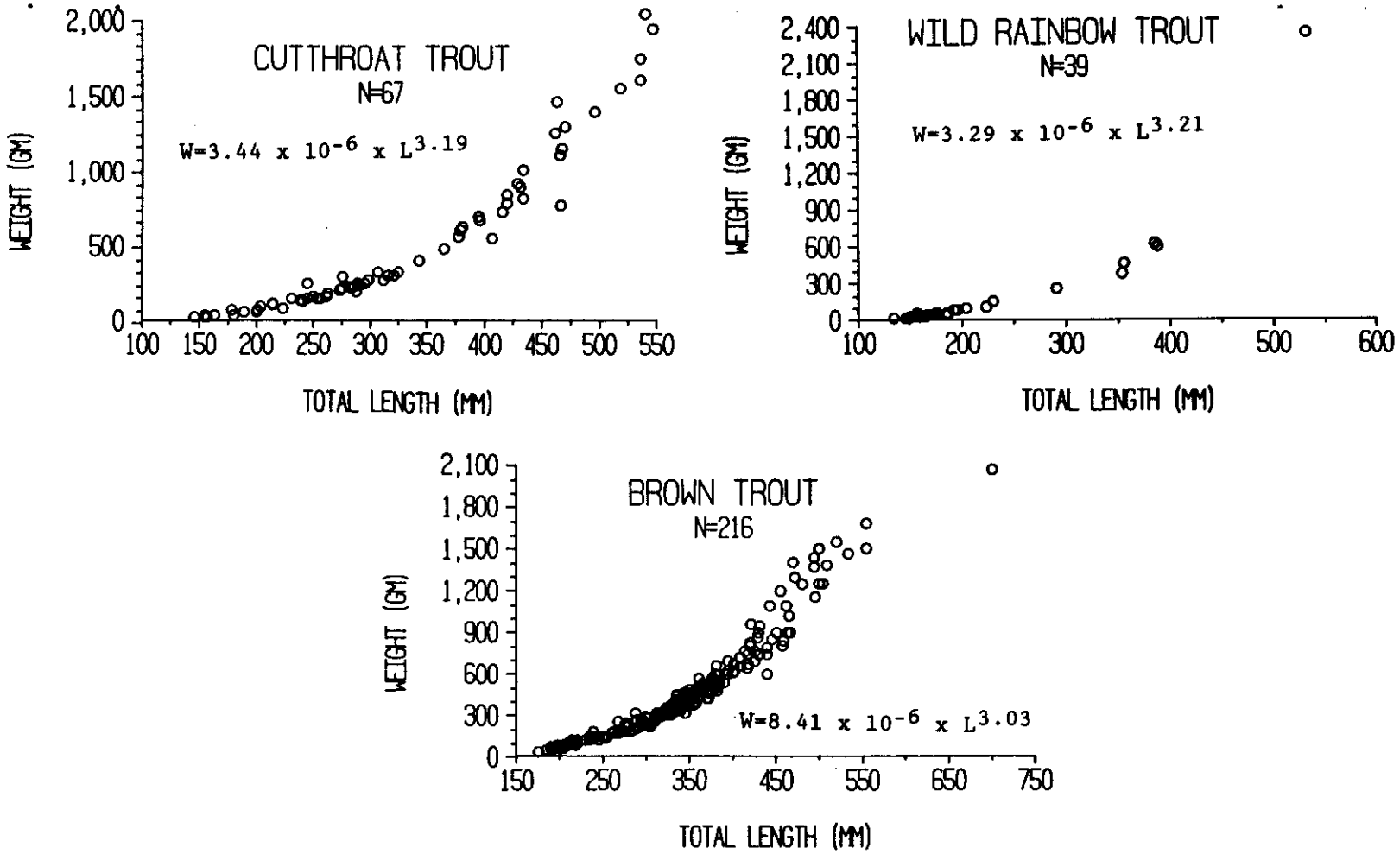

Figure 8. Length-weight relationships for cutthroat trout, wild rainbow trout and brown trout sampled by electrofishing the Snake River, Henrys Fork to American Falls Reservoir, 1986.

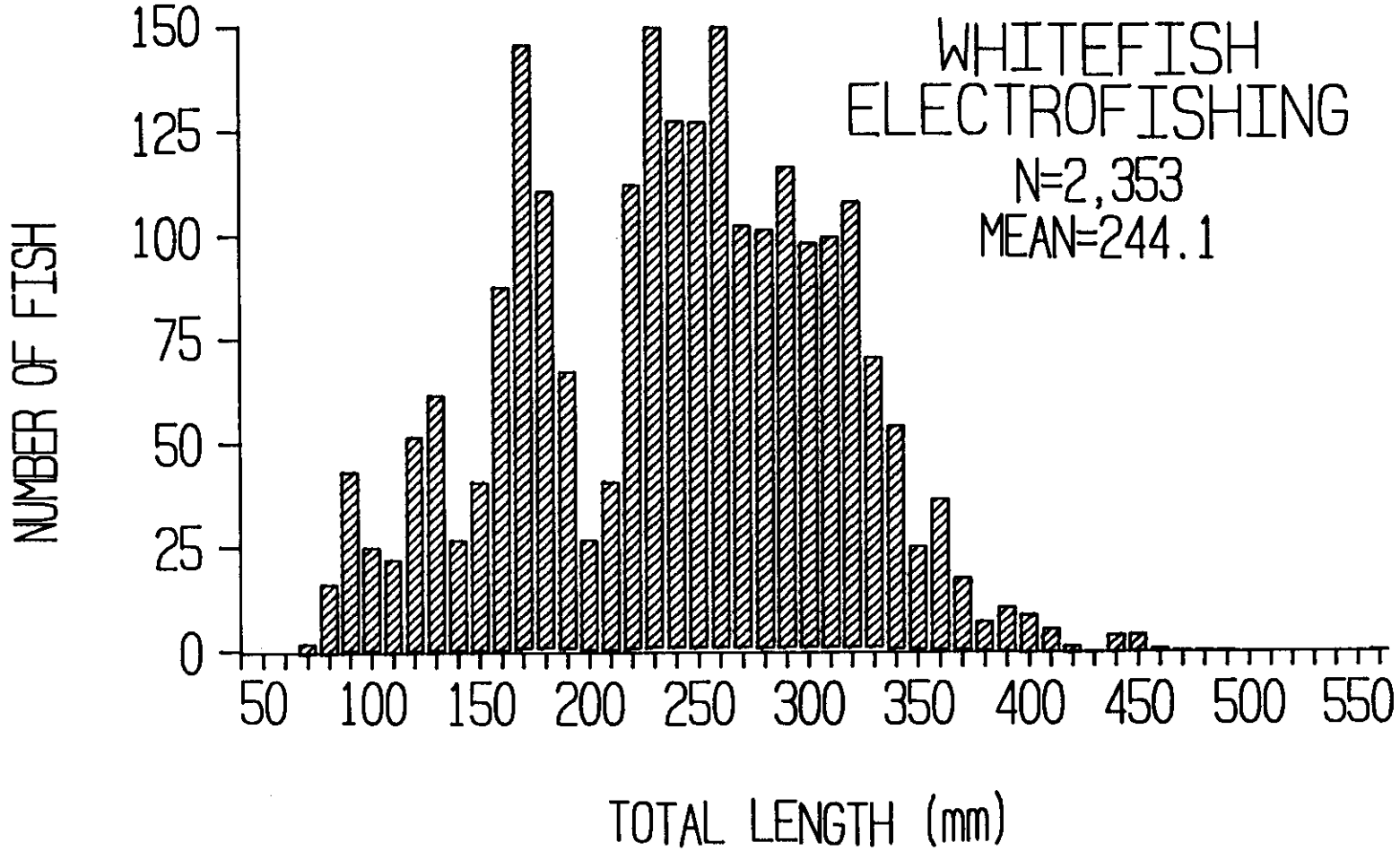

Figure 9. Length frequency of whitefish sampled with electrofishing gear from the Snake River, Henrys Fork to American Falls Reservoir, 1986.

Section 3 (the portion of river adjacent to Idaho Falls) probably supports the majority of fishing effort expended within the study area. Extensive angler interviews in 1986 indicated that anglers caught primarily hatchery rainbow as well as brown, cutthroat and wild rainbow trout at a rate of 0.15 fish/hour. The catch rate in this section could probably be improved with additional hatchery releases. A more intensive survey of the fishery is also planned for this section.

Section 4 has at least nine major irrigation diversions, one hydro project under construction and another hydro project proposed. The irrigation diversions reduce instream flows, impede fish passage at low flows, eliminate riffle areas, increase siltation and impede boat navigation. Due to limited vehicular access and interrupted boat navigation, no additional evaluation of the fishery is planned for this area. The harvest in this section is composed primarily of brown trout.

Sections 5 and 6 are almost entirely boat navigable (American Falls Reservoir to the Watson Slough irrigation diversion at Blackfoot) but vehicular access is limited to the major sites located at the railroad bridge at Blackfoot, Tilden Bridge, Jackson's Trout Farm and McTucker Springs. Due to navigational access, a more intensive evaluation of the fishery is planned.

The Idaho Fisheries Management Plan calls for an evaluation of smallmouth bass introductions into this area. Temperature is the most important single factor limiting smallmouth bass distribution (Coutant 1975). Smallmouth bass initiate spawning in the spring when temperatures reach 15 °C (Coble 1975). During an average year, Snake River temperatures reach 15 °C by mid-June. Temperatures of 26 to 29 °C produce optimal smallmouth bass growth (Coble 1975; Coutant 1975). Temperatures of the Snake River above American Falls Reservoir seldom exceed 21 °C but are only slightly less than Snake River temperatures in Hells Canyon where smallmouth bass populations reproduce and exhibit moderate growth (Lukens 1986). During average years, the bass growing season would extend from April into October.

Riverine habitat for smallmouth bass of all sizes consists of deep pools, moderate current, cover and gravel or rubble substrate (Coble 1975; Edwards et al. 1983). This portion of the Snake River with low average gradient (0.80 m/km) has adequate deep-water, low-velocity habitat. Cover is provided by undercut banks and partially submerged, fallen trees. Substrate is primarily gravel and sand. Spawning generally occurs in calm water, 0.3 to 1 m deep, over a rocky substrate of gravel or rubble, adjacent to cover, such as boulders or stumps (Coble 1975; Edwards et al. 1983). Flows and temperatures must remain constant during spawning and incubation. Lack of spawning habitat would probably be the primary factor limiting establishment of smallmouth bass in this portion of the Snake River. There is little shallow water cover available, and substrate is probably finer than optimum. Also, irrigation withdrawals would probably commence when bass were spawning or incubating.

The diet of juvenile smallmouth bass consists primarily of smaller insects while adults rely on larger insects, crayfish and fish (Coble 1975; Edwards et al. 1983). In the lower portion of the Snake River study area, insect production does not appear limiting and abundant forage is available in the form of shiners, whitefish, dace, chubs and suckers. The status of crayfish populations is unknown.

ACKNOWLEDGEMENTS

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A P P E N D I C E S

Appendix A. Creel census data, by two-week interval, for Section 1 (Henrys Fork to Highway 48 Bridge).

Interval number	Period covered	Anglers	Hours	Trout caught	Catch rate (fish/hr)
1	4/21 - 5/4	--	--	--	--
2	5/5 - 5/18	--	--	--	--
3	5/19 - 6/1	--	--	--	--
4	6/2 - 6/15	--	--	--	--
5	6/16 - 6/29	2	1.25	0	0
6	6/30 - 7/13	4	4.00	0	0
7	7/14 - 7/27	3	6.00	0	0
8	7/28 - 8/10	6	15.50	3	0.19
9	8/11 - 8/24	10	19.50	3	0.15
10	8/25 - 9/7	2	3.00	1	0.33
11	9/8 - 9/21	5	1.25	0	0
12	9/22 - 10/5	--	--	--	--
13	10/6 - 10/19	--	--	--	--
14	10/20 - 11/2	1	2.00	1	0.50
Total		33	52.50	8	0.15

Appendix B. Creel census data, by two-week interval, for Section 2 (Highway 48 Bridge to Upper Power Plant).

Interval number	Period covered	Anglers	Hours	Trout caught	Catch rate (fish/hr)
1	4/21 - 5/4	2	3.50	1	0.29
2	5/5 - 5/18	1	2.00	0	0
3	5/19 - 6/1	7	7.75	1	0.13
4	6/2 - 6/15	9	7.75	0	0
5	6/16 - 6/29	4	1.75	0	0
6	6/30 - 7/13	1	3.00	3	1.00
7	7/14 -7/27	6	7.00	0	0
8	7/28 - 8/10	2	8.00	2	0.25
9	8/11 - 8/24	1	0.50	0	0
10	8/25 - 9/7	--	--	--	--
11	9/8 - 9/21	5	4.50	1	0.22
12	9/22 - 10/5	7	9.00	2	0.22
13	10/6 - 10/19	--	--	--	--
14	10/20 - 11/2	1	1.00	0	0.0
Total		46	55.75	10	0.18

Appendix C. Creel census data, by two-week interval, for Section 3 (Upper Power Plant to Lower Power Plant).

Interval number	Period covered	Anglers	Hours	Trout caught	Catch rate (fish/hr)
1	4/21 - 5/4	5	11.50	1	0.09
2	5/5 - 5/18	13	12.00	3	0.25
3	5/19 - 6/1	36	41.25	9	0.22
4	6/2 - 6/15	58	79.25	5	0.06
5	6/16 - 6/29	23	18.25	2	0.11
6	6/20 - 7/13	22	16.25	0	0
7	7/14 - 7/27	11	9.50	0	0
8	7/28 - 8/10	26	46.75	9	0.19
9	8/11 - 8/24	4	5.50	0	0
10	8/25 - 9/7	9	11.00	0	0
11	9/8 - 9/21	34	51.25	8	0.16
12	9/22 - 10/5	32	35.50	12	0.34
13	10/6 - 10/19	17	11.50	1	0.09
14	10/20 - 11/2	25	29.75	5	0.17
Total		315	379.25	55	0.15

Appendix D. Creel census data, by two-week interval, for Section 4 (Lower Power Plant to Interstate 15 Bridge).

Interval number	Period covered	Anglers	Hours	Trout caught	Catch rate (fish/hr)
1	4/21 - 5/4	1	1.00	0	0
2	5/5 - 5/18	2	2.50	1	0.40
3	5/19 - 6/1	5	3.50	1	0.29
4	6/2 - 6/15	30	20.50	2	0.10
5	6/16 - 6/29	6	11.25	0	0
6	6/30 - 7/13	12	8.25	0	0
7	7/14 - 7/27	10	24.50	8	0.33
8	7/28 - 8/10	37	35.75	1	0.03
9	8/11 - 8/24	2	2.00	0	0
10	8/25 - 9/7	18	17.00	0	0
11	9/8 - 9/21	11	29.00	0	0
12	9/22 - 10/5	16	11.75	5	0.43
13	10/6 - 10/19	2	2.25	5	2.22
14	10/20 - 11/2	38	40.75	6	0.15
Total		190	210.00	29	0.14

Appendix E. Creel census data, by two-week interval, for Section 5 (Interstate 15 Bridge to Blackfoot River).

Interval number	Period covered	Anglers	Hours	Trout caught	Catch rate (fish/hr)
1	4/21 - 5/4	1	0.50	0	0
2	5/5 - 5/18	0	0	0	0
3	5/19 - 6/1	2	1.00	0	0
4	6/2 - 6/15	5	2.25	0	0
5	6/16 - 6/29	2	1.00	0	0
6	6/30 - 7/13	4	3.50	0	0
7	7/14 - 7/27	2	1.00	0	0
8	7/28 - 8/10	0	0	0	0
9	8/11 - 8/29	0	0	0	0
10	8/25 - 9/7	2	0.50	2	4.00
11	9/8 - 9/21	1	0.75	0	0
1	9/22 - 10/5	0	0	0	0
13	10/6 - 10/19	0	0	0	0
14	10/20 - 11/2	3	0.75	0	0.0
Total		22	11.25	2	0.18

Appendix F. Creel census data, by two-week interval, for Section 6 (Blackfoot River to American Falls Reservoir).

Interval number	Period covered	Anglers	Hours	Trout caught	Catch rate (fish/hr)
1	4/21 - 5/4	--	--	--	--
2	5/5 - 5/18	--	--	--	--
3	5/19 - 6/1	--	--	--	--
4	6/2 - 6/15	--	--	--	--
5	6/16 - 6/29	2	0.50	0	0
6	6/30 - 7/13	1	1.00	0	0
7	7/14 - 7/27	3	6.00	0	0
8	7/28 - 8/10	2	16.00	6	0.38
9	8/11 - 8/24	3	0.75	0	0
10	8/25 - 9/27	13	30.50	3	0.10
11	9/8 - 9/21	4	6.50	0	0
12	9/22 - 10/5	2	1.50	0	0
13	10/6 - 10/19	10	18.50	0	0
14	10/20 - 11/2	5	6.50	0	0.0
Total		45	87.75	9	0.10

Appendix G. Residency of anglers fishing six sections of the Snake River, Henrys Fork to American Falls Reservoir, April 21 to November 2, 1986.

	Section					
Residency	1	2	3	4	5	6
Residents - county						
Ada			2			
Bannock						12
Bear Lake		1				
Bingham	2	2	5	95	20	31
Bonneville	12	29	277	86		
Clark		1	4			
Custer		1				
Fremont			1			
Jefferson	19	10	3	1		
Jerome			4			
Madison		1		2		
Power						2
Teton			2			
Twin Falls				1		
Nonresidents						
AL			1			
AZ		1				
CA			1	5		
CO			1			
FL			2			
IL			2			
TX			1			
UT			8		2	
CAN			1			

Appendix H. Number of game fish, by section, sampled by electrofishing the Snake River between Henrys Fork and American Falls Reservoir, 1986. This data is represented graphically in Figure 6.

Section	Brown trout	Cutthroat trout	Hatchery rainbow	Wild rainbow	Whitefish	Misc.	Total
1	44	23	0	18	96	3[a]	184
2	59	13	0	15	383	0	470
3	28	22	17	0	411	0	478
4	62	2	5	0	651	0	720
5	13	0	4	0	216	0	233
6	10	7	36	5	592	1[b]	651
Total	216	67	62	38	2,349	4	2,736

[a] 1 rainbow-cutthroat hybrid and 2 yellow perch
[b] 1 lake trout

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